

**STATUS DISPLAY FOR AN IMAGE CAPTURING DEVICE**

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## FIELD OF THE INVENTION

**[0001]** The present invention relates generally to an image capturing device, and more particularly to a status display for an image capturing device.

## BACKGROUND OF THE INVENTION

**[0002]** Image capturing devices are widely used to capture scenes, persons, events, settings, etc. Image capturing devices, such as digital still cameras, typically include a camera-back display, such as an LCD screen. The camera-back display may be used to display captured images. The camera-back display may also be used to display a continuous sequence of images in a live view mode, wherein the user can press the shutter button at any time during the live view mode in order to capture an image.

**[0003]** The user may monitor camera status information during any type of image capturing in order to keep track of camera operating characteristics. The status information may include a battery power level, an image resolution setting, a flash status, etc. The user may need to monitor the status information before an image capture in order to determine that the image resolution is on a desired setting, to check the battery level, to determine whether the camera is in a proper flash mode, etc. Therefore, the user may often look at the status display before or during an image capturing session.

**[0004]** FIG. 1 shows a status display LCD according to the prior art. The prior art approach to monitoring camera status information has typically been done through such a display on the top of the camera. The prior art status display is typically an LCD display and is included in addition to a camera-back display, which is typically also an LCD display.

**[0005]** The status display according to the prior art has several drawbacks. The prior art status display is located at the top of the camera. The prior art places the status display on the top of the camera regardless of how inconvenient or undesirable this may be to the user. As a result, it is not easily viewed during an image capturing operation. The placement of the prior art status display is inconvenient because the user is looking through the view finder or at the camera-back display when the camera is in use, and not at the top of the camera. In addition, the prior art status display is not easily viewed during an image review mode, where the user is looking at the camera-back display. Moreover, there is no user control over the inclusion or placement of the prior art status display. Furthermore, the prior art status display requires duplicate LCD display devices and therefore is more costly to manufacture.

**[0006]** Therefore, there remains a need for improvements in image capturing devices.

#### SUMMARY OF THE INVENTION

**[0007]** An image capturing device comprises a camera-back display and a status display provided within the camera-back display. The status display displays one or more status information items of said image capturing device.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0008]** FIG. 1 shows a status LCD display according to the prior art;

**[0009]** FIG. 2 is a rear view of an image capturing device according to one embodiment of the invention;

[0010] FIG. 3 is a schematic of the image capturing device according to another embodiment of the invention; and

[0011] FIG. 4 is a flowchart of a status information display method for an image capturing device.

#### DETAILED DESCRIPTION

[0012] FIG. 2 is a rear view of an image capturing device 200 according to one embodiment of the invention. The image capturing device 200 includes a camera-back display 205 that includes a status display 208. The camera-back display 205 may be an LCD. In addition, the image capturing device 200 may include a status display control button 216.

[0013] The status display 208 may be used to display any manner of status information of the image capturing device 200. For example, the status information may include a battery power level, a flash mode (*i.e.*, auto, off, on, etc.), and an image resolution (*i.e.*, 640 x 480, 800 x 600, 1024 x 768, etc.). The status display 208 may cover only a portion of the camera-back display 205 (*i.e.*, a picture-in-picture status display), or alternatively may cover an entire display area of the camera-back display 205.

[0014] The status display control button 216 in one embodiment comprises a four-way rocker switch that may be used to move the status display 208 within the camera-back display 205. The status display control button 216 may generate movement signals that may be used to position the status display 208 within the camera-back display 205. The status display control button 216 may include left, right, up, and down input contacts wherein corresponding left, right, up, and down

movements of the status display 208 are generated by the processor 224 (see FIG. 3 and accompanying discussion).

**[0015]** Alternatively, in another embodiment the status display control button 216 comprises a five-way rocker switch that additionally includes a center press input switch. When pressed, the center press input switch may toggle (*i.e.*, may enable and disable) the display enable state 234 of the status display 208 (see FIG. 3 and accompanying discussion). Therefore, the status display control button 216 in this embodiment may be used to show or hide the status display 208.

**[0016]** FIG. 3 is a schematic of the image capturing device 200 according to another embodiment of the invention. The image capturing device 200 includes a lens apparatus 202, an image sensor 221, a processor 224, the camera-back display 205, the status display control button 216, and a memory 229.

**[0017]** The image sensor 221 may be any type of electronic image sensor capable of capturing images, such as a charge coupled device (CCD) sensor or a complementary metal oxide semiconductor (CMOS) sensor, for example.

**[0018]** The processor 224 may be any type of general purpose processor. The processor 224 executes a control routine contained in the memory 229. In addition, the processor 224 receives inputs and conducts image capturing operations.

**[0019]** The memory 229 may be any type of digital memory. The memory 229 may include a display enable variable 234, a picture-in-picture routine 236, and one or more status information items 239. In addition, the memory 229 may store software or firmware to be executed by the processor 224. Furthermore, the memory 229 may store captured images.

**[0020]** The display enable variable 234 determines whether the status display 208 is displayed within the camera-back display 205. The display enable variable

234 may be toggled by a center press of the status display control button 216.

Alternatively, the display enable variable 234 may be toggled by any other manner of user input device, such as buttons, switches, a user interface, etc.

**[0021]** The picture-in-picture routine 236 is a software routine used by the processor 224 to generate the status display 208 within the camera-back display 205. The picture-in-picture routine 236 takes into account user inputs that may control the size and placement of the status display. In addition, the picture-in-picture routine 236 displays selected status information items. The selected status information items may be a default group of status information items or may be selected by the user. Therefore, the status display 208 according to the invention allows more flexibility in the display of status information and allows the user to choose which status information to display.

**[0022]** The one or more status information items 239 may be any manner of stored status information for the image capturing device 200. The one or more status information items 239 may include, for example, a battery power level, a flash mode setting, an image resolution setting, a number of captured images currently stored in the memory 229, etc.

**[0023]** FIG. 4 is a flowchart 400 of a status information display method for an image capturing device. In step 402, a camera-back display 205 is provided on the image capturing device 200.

**[0024]** In step 408, a status display 208 is provided in a portion of the camera-back display 205. The status display 208 may cover part or all of the camera-back display 205. The status information items may be user selectable.

**[0025]** In step 413, a status display control button 216 is provided. The status display control button 216 may control the position of the status display 208 within

the camera-back display 205. In addition, the status display control button 216 may control the size of the status display 208. Furthermore, the status display control button 216 may enable and disable the status display 208.

**[0026]** In one embodiment, the status display 208 may continue to be displayed on the camera-back display 205 even when there is no image being displayed, i.e., the rest of the camera-back display 205 may be dark. Therefore, the user may be able to view the status information even when the image capturing device 200 is not in an image capturing mode.

**[0027]** The status display according to the invention may be applied to any type of image capturing device. In one embodiment, the image capturing device may be a digital still camera. In another embodiment, the image capturing device may be a digital or analog video camera including a small display screen.

**[0028]** The status display according to the invention provides several benefits. A cost reduction is achieved due to the elimination of a separate dedicated status display. The status display can show any type of status information. The status display can show varying numbers of status information items. Therefore, the status display according to the invention may include more status information items than can typically be accommodated by a status display according to the prior art.

**[0029]** Another benefit of the invention is that the status display may be user selectable, wherein the user can select various amounts of status information to be displayed and may select the size and position of the status display.

**[0030]** Yet another benefit of the invention is that the status display is positioned on the back of the camera where it can be seen during a review mode of capturing images. The status display can also be seen during image capture, if the image capture is performed during a live mode. Moreover, the status display may now be

more easily seen even if the user is using the viewfinder to capture an image, as the user will have to draw only slightly away from the viewfinder in order to see the status display within the camera-back display.

[0031] Moreover, the user can enable and disable the status display so that the status display can be removed from the camera-back display if desired. This may be desired by the user during the picture capturing mode wherein the user views the status information before initiating the image capture mode and then turns it off during the remainder of the image capturing mode.